

AZCC1 Final Review Key

$$\frac{LCD}{(h+4)(h-4)} \quad 1) \frac{h-20}{(h+4)(h-4)} + \frac{2(h+4)}{h-4(h+4)} \Rightarrow \frac{h-20}{(h+4)(h-4)} + \frac{2h+8}{(h+4)(h-4)} \Rightarrow \frac{3h-12}{(h+4)(h-4)}$$

$$\frac{3(h-4)}{(h+4)(h-4)} = \boxed{\frac{3}{h+4}}$$

$$\frac{LCD}{(x+5)(x-1)(x+3)} \quad 2) \frac{4(x+1)}{(x+5)(x-1)(x+3)} - \frac{3(x+5)}{(x+1)(x-1)(x+3)} \Rightarrow \frac{4x+4 - (3x+15)}{(x+1)(x-1)(x+3)} = \boxed{\frac{x-11}{(x+1)(x-1)(x+3)}}$$

$$\frac{LCD}{x} \quad 3) \frac{(x) \cdot 1 - \frac{1}{x}}{(x) \cdot x - 2 + \frac{1}{x}} \Rightarrow \frac{x-1}{x^2-2x+1} \Rightarrow \frac{x-1}{(x-1)(x-1)} = \boxed{\frac{1}{x-1}}$$

$$\frac{LCD=6}{(6)} \quad 4) \frac{2x+3}{6} - \frac{2x+3}{3} = \frac{1}{6} \Rightarrow 2x+3 - (4x+6) = 3$$

$$\Downarrow$$

$$2x+3 - 4x - 6 = 3$$

$$-2x - 3 = 3$$

$$-2x = 6$$

$$\boxed{x = -3}$$

$$5) \frac{1}{x+3} - \frac{2}{3-x} = \frac{4}{x^2-9} \Rightarrow \frac{1}{x+3} + \frac{2}{x-3} = \frac{4}{(x+3)(x-3)}$$

LCD = (x+3)(x-3)

Switch order and switch sign

$$1(x-3) + 2(x+3) = 4$$

$$x-3 + 2x+6 = 4$$

$$3x+3 = 4$$

$$3x = 1$$

$$\boxed{x = \frac{1}{3}}$$

$$6) \frac{2x^2+12x+6=0}{2} \Rightarrow x^2+6x+3=0 \Rightarrow x^2+6x=-3$$

$$x^2+6x+\boxed{9} = -3+\boxed{9}$$

$$\frac{6}{2} = 3$$

↓

$$3^2 = 9$$

$$(x+3)^2 = 6 \Rightarrow \pm\sqrt{(x+3)^2} = \pm\sqrt{6}$$

$$x+3 = \pm\sqrt{6}$$

$$\begin{matrix} -3 & -3 \end{matrix}$$

$$\boxed{x = -3 \pm \sqrt{6}}$$

$$7) 2x^2 = 7x - 4$$

$$2x^2 - 7x + 4 = 0$$

$$a=2 \quad b=-7 \quad c=4$$

$$x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(2)(4)}}{2(2)}$$

$$\boxed{x = \frac{7 \pm \sqrt{17}}{4}}$$

$$8) 2x^2 + 3x + 2 = 0$$

$$a=2 \quad b=3 \quad c=2$$

use the discriminant

$$b^2 - 4ac$$

$$3^2 - 4(2)(2)$$

$$9 - 16$$

-7 ← Negative therefore
the roots are imaginary

B

$$9) 2y^2 + 3y = -2$$

$$2y^2 + 3y + 2 = 0$$

$$a=2 \quad b=3 \quad c=2$$

$$y = \frac{-3 \pm \sqrt{3^2 - 4(2)(2)}}{2(2)}$$

$$y = \frac{-3 \pm \sqrt{-7}}{4} \Rightarrow \frac{-3 \pm i\sqrt{7}}{4} \Rightarrow \frac{-3 \pm i\sqrt{7}}{4} \quad \text{B}$$

multiply by the reciprocal

$$10) \frac{x(x-3)}{(2x-3)(x+2)} \div \frac{(x-3)(x-2)}{(x+2)(x-2)} \Rightarrow \frac{x(x-3)}{(2x-3)(x+2)} \cdot \frac{(x+2)(x-2)}{(x-3)(x-2)} = \frac{x}{2x-3}$$

$$11) 3x^2 - 12$$

$$3(x^2 - 4)$$

$$3(x+2)(x-2)$$

$$12) x^3 - x^2 - 6x$$

$$x(x^2 - x - 6)$$

$$x(x-3)(x+2)$$

$$13) a^3 - 2a^2 + a - 2$$

$$a^2(a-2) + 1(a-2)$$

$$(a^2+1)(a-2)$$

$$14) \frac{5x^2 - 15x}{27x - 3x^3} \Rightarrow \frac{5x(x-3)}{3x(9-x^2)} \Rightarrow \frac{5x(x-3)}{3x(3+x)(3-x)} = \frac{-5}{3(3+x)}$$

$$15) \frac{y^2 + 3y - 28}{y^2 - 49}$$

$$\Rightarrow \frac{(y+7)(y-4)}{(y+7)(y-7)} = \frac{y-4}{y-7}$$

$$16) \frac{10}{x^2-25} \Rightarrow \text{Set denominator equal to 0} \quad x^2-25=0$$

$$(x+5)(x-5)=0$$

$$x=-5 \quad x=5$$

Therefore when $x = \pm 5$ the fraction will be undefined

$$17) \frac{x^2-49}{2x^2-3x} \quad 2x^2-3x=0$$

$$x(2x-3)=0$$

$$x=0 \quad 2x-3=0$$

$$2x=3$$

$$x=\frac{3}{2}$$

When $x=0$ or $x=\frac{3}{2}$ the fraction is undefined

$$18) \frac{x-\sqrt{9-2x}}{-x} = 3$$

$$\frac{-\sqrt{9-2x}}{-1} = \frac{3-x}{-1}$$

$$\sqrt{9-2x} = -3+x$$

$$(\sqrt{9-2x})^2 = (x-3)^2$$

$$9-2x = x^2-6x+9$$

$$\frac{-9+2x}{+2x-9}$$

$$0 = x^2-4x$$

$$0 = x(x-4)$$

$$\cancel{x=0} \quad \boxed{x=4}$$

reject

Check:

$$x=0 \quad 0 - \sqrt{9-2(0)} = 3$$

$$0 - \sqrt{9} = 3$$

$$0-3=3$$

$$-3=3 \quad \text{No!}$$

$$x=4 \quad 4 - \sqrt{9-2(4)} = 3$$

$$4 - \sqrt{1} = 3$$

$$4-1=3$$

$$3=3 \quad \checkmark$$

$$19) 2\sqrt{2x+3} + x = 1$$

$$(2\sqrt{2x+3})^2 = (1-x)^2$$

$$4(2x+3) = 1 - 2x + x^2$$

$$8x + 12 = x^2 - 2x + 1$$

$$\frac{-8x - 12}{-8x - 12} \quad \frac{-8x - 12}{-8x - 12}$$

$$0 = x^2 - 10x - 11$$

$$x = -1$$

$$(x-11)(x+1)$$

$$x=11 \quad \boxed{x=-1}$$

reject

Check:

$$x=11 \quad 2\sqrt{2(11)+3} + 11 = 1$$

$$2\sqrt{25} + 11 = 1$$

$$2(5) + 11 = 1$$

$$10 + 11 = 1$$

$$21 = 1 \text{ No!}$$

$$2\sqrt{2(-1)+3} - 1 = 1$$

$$2\sqrt{1} - 1 = 1$$

$$2(1) - 1 = 1$$

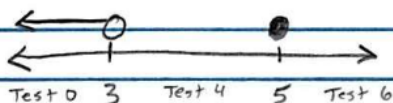
$$2 - 1 = 1$$

$$1 = 1 \checkmark$$

$$20) \frac{x^2 - 10x + 25}{x-3} \Rightarrow \frac{(x-5)(x-5)}{x-3} \neq 0$$

$$x=5 \leftarrow 2 \text{ times closed circle}$$

$$x=3 \leftarrow \text{open circle}$$



$$\text{Set builder: } \{x \mid x < 3 \text{ or } x = 5\}$$

$$\frac{(0-5)(0-5)}{0-3} \quad \frac{(4-5)(4-5)}{4-3} \quad \frac{(6-5)(6-5)}{6-3}$$

$$\frac{(-5)(-5)}{-3} \quad \frac{(-1)(-1)}{1} \quad \frac{(1)(1)}{3}$$

$$\frac{25}{-3}$$

$$\frac{1}{1}$$

$$\frac{1}{3}$$

$$-$$

$$+$$

$$+$$

$$\text{Interval: } (-\infty, 3) \cup [5]$$

$$21) x^2 - 2x < 24 \quad \underline{\text{GOLI}}$$

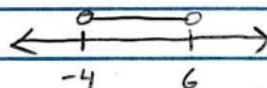
$$x^2 - 2x - 24 < 0$$

$$(x-6)(x+4)$$

$$\text{SB: } \{x \mid -4 < x < 6\}$$

$$\text{open } 6 \quad -4 \text{ open}$$

$$\text{Int: } (-4, 6)$$



⊗ Don't forget 0 placeholders

22) $x^2 + 2x + 1 \overline{) x^3 - 7x^2 + 13x - 17}$

$$\begin{array}{r} x^3 - 7x^2 + 13x - 17 \\ \underline{-(x^3 + 2x^2 + x^3)} \\ -7x^4 - x^3 + 2x^2 \\ \underline{-(-7x^4 - 14x^3 - 7x^2)} \\ 13x^3 + 9x^2 + 0x \\ \underline{-(13x^3 + 26x^2 + 13x)} \\ -17x^2 - 13x - 5 \\ \underline{-(-17x^2 - 34x - 17)} \\ 21x + 12 \end{array}$$

$x^3 - 7x^2 + 13x - 17 + \frac{21x + 12}{x^2 + 2x + 1}$

23) $x - 1 = 0$ $3(1)^{107} + 14(1)^{35} - 16(1)$
 $x = 1$ $3 + 14 - 16$
 $17 - 16$
 1

24) $x + 3 = 0$ $f(-3) = (-3)^3 + (-3)^2 - 5(-3) + 3$
 $-3 = -3$
 $x = -3$ $-27 + 9 + 15 + 3$
 $0 \leftarrow \text{Therefore it is a factor}$

25) $x + 16 = 0$ 26) $(x-3)(2x-1)(3+x)$
 $x = -16$ $x = 3 \quad x = \frac{1}{2} \quad x = -3$

27) $x = -1 \quad x = -2 \quad x = -3$ 28) $x - 2 > 0 \leftarrow \text{Can't be negative because it is under a radical. Can't be equal to zero because it's a denominator}$
 $y = (x+1)(x+2)(x+3)$ $x > 2$

29) $x^2 - 16 \neq 0$ Can't equal 0 because its
 $(x-4)(x+4) \neq 0$ in the denominator
 $\boxed{x \neq 4 \quad x \neq -4}$

30) $f(x) = (3x+1)$ $g(f(x))$ means to put $f(x)$ into x in $g(x)$
 $g(x) = x^2 - 3$
 $g(f(x)) = (3x+1)^2 - 3 = (3x+1)(3x+1) - 3$
 $9x^2 + 3x + 3x + 1 - 3$
 $\boxed{9x^2 + 6x - 2}$

31) $g(x) = f(x+7) - 3$ $(5, -8)$
 $\uparrow \quad \uparrow$ left 7 down 3 $-7 \quad -3$
 $\boxed{(-2, -11)}$

32) \boxed{B} x-value of 3 repeats

33) $g(x) = f(2x) - 3$
 $\downarrow \quad \swarrow$
 divide x by 2 subtract 3 from y
 $(-12, 4)$
 $\div 2 \quad -3$
 $\boxed{(-6, 1)}$
 ① Horizontal shrink
 ② Shift down

34) $\frac{y}{x} = \frac{8}{32} \Rightarrow \frac{32y}{32} = \frac{8x}{32} \Rightarrow y = \frac{8x}{32} = \frac{1}{4}x$
 \boxed{B}

$$35) \frac{\text{Cost}}{\text{miles}} = \frac{2240}{2200} = \frac{x}{4000} \quad \frac{8960000}{2200} = \frac{2200x}{2200}$$

$$\boxed{\$4072.73 = x}$$

$$36) \frac{P}{9} = \frac{7}{12} \quad 37) \frac{44.70}{6} = \frac{\$}{8}$$

$$\frac{84}{9} = \frac{9P}{9} \quad \frac{357.6}{6} = \frac{6\$}{6}$$

$$\boxed{P = \frac{28}{3}} \quad \boxed{59.60 = \$}$$

$$38) \begin{cases} 2(2x + y = 4) \\ 4x - 3y = 13 \end{cases} \Rightarrow \begin{cases} 4x + 2y = 8 \\ 4x - 3y = 13 \end{cases} \quad \begin{matrix} \text{Find} \\ x \end{matrix}$$

$$\begin{matrix} 4x + 2y = 8 \\ -4x - 3y = 13 \\ \hline 5y = -5 \\ y = -1 \end{matrix} \quad \begin{matrix} 2x + (-1) = 4 \\ 2x - 1 = 4 \\ 2x = 5 \\ \boxed{x = \frac{5}{2}} \end{matrix}$$

$$39) \begin{cases} ① x + y - z = 5 \\ ② 3x - 2y + z = 8 \\ ③ 2x + 2y - 2z = 7 \end{cases}$$

$$2① - ③ \Rightarrow \begin{cases} 2(x + y - z) = 10 \\ 2x + 2y - 2z = 7 \end{cases}$$

$$\begin{matrix} 2x + 2y - 2z = 10 \\ 2x + 2y - 2z = 7 \\ \hline 0 + 0 + 0 = 3 \end{matrix}$$

$$0 = 3$$

No Solution

$$40) \quad a) \frac{2591.90 - 1000}{60 - 10} = \frac{1591.90}{50} = 31.8 \quad c) \frac{3135.80 - 1770.80}{72 - 36} = \frac{1365}{36} = 37.92$$

$$b) \frac{2990 - 1352}{69 - 19} = \frac{1638}{50} = 32.76 \quad d) \frac{3186 - 2591.90}{73 - 60} = \frac{594.7}{13} = 45.7$$

$$41) \frac{306.25 - 56.25}{70 - 30} = \frac{250}{40} = \boxed{6.25}$$

$$42) \quad f(x) \\ \frac{80 - .625}{4 - (-3)} = 11.34$$

$$g(x) \\ g(-3) = 4(-3)^3 - 5(-3)^2 + 3 = -150 \\ g(4) = 4(4)^3 - 5(4)^2 + 3 = 179$$

$$\frac{179 - (-150)}{4 - (-3)} = \frac{329}{7} = 47$$

$g(x)$ has a
greater average
rate of change
over $[-3, 4]$

$$43) \quad y = 2x^2 - 4x - 4 \\ \frac{y}{2} = x^2 - 2x - 2$$

$$\frac{y}{2} = x^2 - 2x + \boxed{1} - 2 - \boxed{1}$$

$$2 \left(\frac{y}{2} = (x-1)^2 - 3 \right)$$

$$y = 2(x-1)^2 - 6$$

$$\boxed{\text{vertex} = (1, -6)}$$

$$44) \quad x^2 + 10x - 8y + 33 = 0$$

$$\frac{10}{2} = 5 \quad x^2 + 10x + \boxed{25} - \boxed{25} - 8y + 33 = 0$$

$$5^2 = 25 \quad (x+5)^2 - 8y + 8 = 0$$

$$\frac{(x+5)^2 + 8}{8} = \frac{8y}{8}$$

$$\frac{1}{8}(x+5)^2 + 1 = y$$

$$\frac{1}{8} = \frac{1}{4p}$$

$$p = 2$$

$$a) \text{ vertex} = (-5, 0)$$

$$b) \quad \begin{array}{c} (-5, 0) \\ + 2 \end{array}$$

$$\boxed{(-5, 2) = \text{Focus}}$$

$$c) \quad \begin{array}{c} -5, 0 \\ -2 \end{array}$$

$$\boxed{y = -2 \text{ directrix}}$$

$$45) \quad (-2, 1) \quad \text{directrix } y = 3$$



$$\frac{1+3}{2} = 2 \quad d) \text{ vertex is } (-2, 2)$$

$$\frac{3-1}{2} = 1 \quad p = 1$$

$$e) \quad \boxed{y - 2 = \frac{1}{4(1)}(x+2)^2}$$

$$46) \quad y\text{-axis}$$

$$y = \frac{1}{4}(x+2)^2 + 2$$

$$47) \quad \text{the origin } (180^\circ \text{ rotation})$$

$$\begin{aligned}
 48) \quad f) \quad f(-x) &= (-x)^5 - (-x)^3 \\
 &= -x^5 - (-x^3) \\
 &= -x^5 + x^3 \leftarrow \text{Not even} \\
 &= -(x^5 - x^3) \leftarrow \boxed{000}
 \end{aligned}$$

$$\begin{aligned}
 g) \quad f(-x) &= (-x)^4 - (-x)^2 - 6 \\
 &= x^4 - x^2 - 6 \leftarrow \boxed{\text{Even}}
 \end{aligned}$$

$$\begin{aligned}
 h) \quad f(-x) &= \frac{(-x)^3 - (-x)}{(-x)^3 + (-x)} = \frac{-x^3 + x}{-x^3 - x} = \frac{x^3 - x}{x^3 + x} = \frac{x^3 - x}{x^3 + x} \leftarrow \boxed{\text{Even}}
 \end{aligned}$$

$$49) \quad \sum_{x=6}^{10} (3x-2)$$

$$\begin{aligned}
 &3(6)-2 + 3(7)-2 + 3(8)-2 + 3(9)-2 + 3(10)-2 \\
 &\boxed{16 + 19 + 22 + 25 + 28}
 \end{aligned}$$

$$\begin{aligned}
 50) \quad \sum_{n=1}^7 (-2)^{n-1} &= (-2)^{1-1} + (-2)^{2-1} + (-2)^{3-1} + (-2)^{4-1} + (-2)^{5-1} + (-2)^{6-1} + (-2)^{7-1} \\
 &= (-2)^0 + (-2)^1 + (-2)^2 + (-2)^3 + (-2)^4 + (-2)^5 + (-2)^6 \\
 &= 1 + (-2) + 4 + (-8) + 16 + (-32) + 64 \\
 &\quad \boxed{43}
 \end{aligned}$$